RESEARCH

Cariboo Forest Region

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EXTENSION NOTE #11
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Uniform Shelterwood Systems for Douglas-fir/Lodgepole Pine Stands

RESEARCH ISSUE GROUPS

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- **Forest Health**
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The transition zone in the Cariboo Region between the drybelt and wetbelt includes the dry, warm Sub-Boreal Spruce (SBSdw) subzone. This area contributes a significant proportion to the Region's annual allowable cut and comprises some of British Columbia's best Interior sites for growing Douglas-fir. Sites are relatively dry and warm but have a high frequency of growing season radiative frosts. Regeneration success with planted Douglas-fir has been poor and the benefit of an overstory canopy may help to reduce frost problems and improve natural regeneration success while retaining the advanced fir regeneration that is usually present.

These sites also have high values for recreation, wildlife, water supply and aesthetics, as well as range for cattle grazing. A partial cutting silvicultural system is desired to retain aesthetic and visual qualities of these stands while realizing timber and forage production potential.

The current practice in these stands has been to clearcut and plant lodgepole pine, since pine is less susceptible to frost and easier to establish. This practice, however, reduces the component of Douglas-fir in future stands. Earlier attempts at partial cuts have resulted in high windthrow of Douglas-fir residuals, probably due to the frequent occurrence of clay depositional layers in the soil on these sites. This has led to the current reliance on clearcutting in the transition zone.

The purpose of this trial is to test uniform shelterwood systems in combination with timber harvesting methods in mixed stands of Douglas-fir and lodgepole pine.

SHELTERWOOD SYSTEMS

Shelterwood systems are even-aged systems that use the overstory canopy to facilitate the establishment of regeneration before its final removal. Shelterwoods are well-suited to sites that are hot and dry, experience radiative frosts during the growing season, or receive cold winds. The overstory helps to reduce frost occurrence, deflect

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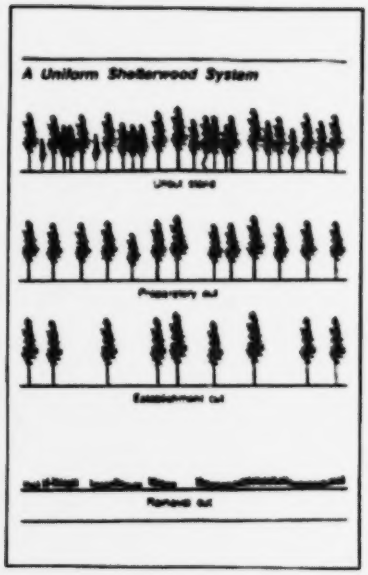

wind, and intercept heavy rainfall that might cause soil erosion, while providing shade for natural regeneration.

Shelterwoods may or may not use a *preparatory cut* to improve the vigour and health of the overstory. The later *establishment cut* removes most of the volume, with good-quality stems left to provide seedfall for natural regeneration and shade for germination. Once an acceptable level of regeneration is achieved, the *removal cut* extracts the remainder of the standing volume. Uniform shelterwood systems remove the canopy uniformly in the preparatory and establishment cuts.

STUDY SITES

Forest Sciences of the Cariboo Forest Region, the UBC Alex Fraser Research Forest, and Weldwood of Canada, Williams Lake Division, have initiated a uniform shelterwood trial in the SBSdw1 subzone, with the cooperation of the Williams Lake and Horsefly Forest Districts.

The study is assessing the suitability of a uniform shelterwood system with different levels of basal area removal for successfully regenerating these stands while achieving values for wildlife, water, range and aesthetics.

The three study sites are located in Skelton Valley at Beedy Creek, and within and adjacent to the UBC Alex Fraser Research Forest near Gavin Lake. Each site consists of stands of mature Douglas-fir/lodgepole pine that are 80 to 120 years old. They are on zonal sites with rolling terrain on variable aspects.

STUDY OBJECTIVES

The objectives of the study are:

- to assess the applicability of a uniform shelterwood system for mixed Douglas-fir/lodgepole pine stands in the SBSdw1 subzone by examining windfirmness and fir regeneration success when manipulating:
  - the intensity of the initial removal cut, and
  - the harvesting system used;
- to measure factors that influence the establishment of Douglas-fir seedlings: seedfall, microsite climate, duff thickness, seed predation and vegetation response;
- to monitor small mammal populations in the treatments; and
- to encourage the extrapolation of the results to the remainder of the SBSdw subzone for operational application.

TRIAL DESIGN

Five treatments were established in Summer 1991 using:

- two levels of basal area removal (30% and 50%) in three and two passes (cuts), respectively,
- two harvesting systems (hand falling with small skidder hauling and feller bunchers with large skidder hauling), and
- one control area with no harvesting.

TRIAL ASSESSMENT

Data have been collected before and after harvesting to assess changes in:

- stand structure,
- vegetation,
- duff thickness,
- natural regeneration,
- logging damage,
- windthrow losses,
- presence of disease and insects,
- microclimate, and
- small mammal use.

EARLY RESULTS

Preliminary results show that harvesting has had little effect on vegetation, and initial blowdown has been minimal. Some Douglas-fir bark beetle attack was evident on all three sites and infected trees have been removed. In addition, small mammal species diversity initially tends to decrease with increased basal area removal.

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